Chapter 3

3. AFFECTED ENVIRONMENT AND ENVIRONMENTAL EFFECTS

3.1 INTRODUCTION

This chapter provides information concerning the affected environment and the environmental effects of the alternatives. The affected environment sections describe the current condition against which the significant environmental effects are evaluated. The following areas are discussed:

- Sediment (Section 3.2)
- Hydrology (Section 3.3)
- Riparian Habitats (Section 3.4)
- Wetlands (Section 3.5)
- Water Quality (Section 3.6)
- Fish (Section 3.7)
- Wildlife (Section 3.8)
- Fire (Section 3.9)
- Cultural Resources (Section 3.10)

The environmental effects related to each of the above resource areas are discussed immediately following the presentation of the affected environment for each resource. The environmental effects sections provide the scientific and analytical basis for the comparison of alternatives presented in Chapter 2. They present the expected effects on the natural and the built environments associated with implementation of the alternatives. All significant or potentially significant environmental consequences are disclosed, including the direct, indirect, and cumulative effects. Effects are quantified where possible, although qualitative discussions are often necessary. Cumulative effects are addressed in a separate section at the end of Chapter 3.

Direct environmental effects are those occurring at the same time and place as the initial cause or action. Indirect effects are those that occur later in time or are spatially removed from the activity but would be considered significant in the foreseeable future. Cumulative effects result from the incremental effects of actions when added to other past, present, and reasonably foreseeable future actions, regardless of what agency or person undertakes such other actions.

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3.1.1   Available Information

There is less than complete knowledge about many of the relationships and conditions of the resources and issue areas including fish and wildlife. The ecology, inventory, and management of a large forest area, whether local, subregional, or regional, is a complex and developing science. The biology of fish and wildlife species prompts questions about population dynamics and habitat relationships. In developing the affected environment and environmental effects sections of this EIS, the analysis team examined the data and relationships used to estimate the effects of the alternatives. The data and level of analysis used were commensurate with the importance of the possible effects. Much of the analysis was based on the geographic information system (GIS) databases of the DNR as they existed in late 1999.

When encountering a gap in information, the analysis team generally either collected the information or developed the information through modeling. In some cases however, the effort required to obtain the information was prohibitively expensive or required too long a period of time, relative to the value of the information. In these cases, the team concluded that the missing information would have added precision to estimates or better specified a relationship; however, the basic data and central relationships are sufficiently well established in the respective sciences that the new information would be unlikely to reverse or nullify understood relationships. Thus, new information would add precision, but was not considered essential to provide adequate information for the decision-makers to make a reasoned choice among the alternatives.

3.1.2   Evaluation Criteria and Relationships Among Sections

Evaluation criteria are defined for each of the resource areas within their individual sections in this chapter. The criteria are briefly defined in a subsection placed immediately before the detailed discussion of environmental effects in all of the sections. Many of the resource areas have a variety of individual potential effects and individually identified criteria that stand alone. For the following sections, however, the relationships among the criteria are more complicated and are interrelated:

- Sediment
- Hydrology
- Riparian Habitats
- Water Quality
- Fish

The evaluation criteria for these sections are defined in greater detail, along with a background literature review, in Appendix B.

The effects on the environmental components of these resource areas are closely related and these interrelationships are shown in Figure 3.1-1. This figure shows the interrelationship of management activities (e.g., timber harvest; road construction, use and maintenance; and pesticide use) with the individual environmental components or individual environmental systems (e.g., riparian system or hydrological system) they affect.

It also shows how effects on one environmental component cascade to other environmental components. For example, timber harvest can influence shade and all other components of the riparian system, and through that effect can influence the temperature and sediment components of water quality. These, in turn, can directly influence the habitat and physiology of fish. Fish can also be directly affected through riparian modifications such as changes in LWD production which can affect fish habitat.

3.1.3   Environmental Effects and Risk Statements

It is desirable to be able to summarize the environmental effects of the alternatives in terms of their potential for meeting the three environmental goals of the Forest Practices Board, namely:

- To provide compliance with the Endangered Species Act for aquatic and riparian-dependent species on non-federal forest lands;
- To restore and maintain riparian habitat on non-federal forest lands to support a harvestable supply of fish; and
- To meet the requirements of the Clean Water Act for water quality on non-federal forest lands.

The Forest Practices Board also has an economic goal that **they** must consider:

- To keep the timber industry economically viable in the state of Washington.

However, this EIS only considers how each element of the alternatives would meet the three environmental goals. The question as to whether each element would meet the environmental goals cannot be definitively answered with a yes or no.

Existing knowledge about most of the relationships that define aquatic and riparian systems is incomplete. The ecology and management of aquatic and riparian habitats within forest ecosystems is a complex and developing science. Therefore, the major conclusions of this EIS relative to meeting the environmental goals of the Forest Practices Board are necessarily expressed in terms of risk. Ideally, risk statements should be quantified. However, because the physical and biological relationships of aquatic and riparian systems are imprecisely defined, and because quantitative measures do not exist for many aspects of the alternatives, the risk statements are given in qualitative terms.

Risk is defined in this EIS as the likelihood that a specific factor will not support the achievement of one or more of the environmental goals. These risk statements assume that other factors (e.g., non-forest practices, ocean conditions, harvest, etc.) do not prevent the goals from being met.

The scientists who conducted the analysis for this EIS developed risk statements based on best professional judgment after weighing all of the quantitative evaluation criteria that were developed, as well as their review of the scientific literature. They also considered the performance targets identified in Schedule L1 of the Forests and Fish Report and the likelihood that they would be achieved. Further, they considered the fact that each alternative incorporates a level of adaptive management, which allows for change in the rules over the long-term, based on feedback from research and monitoring activities. In giving consideration to adaptive management, the efficiency and timelag involved for each adaptive management program was also evaluated.

Finally, the issue of uncertainty was also considered. Because of the lack of information available to make definitive statements regarding risk, each of the risk statements given has a certain amount of uncertainty associated with it. In a few cases, the amount of uncertainty associated with the risk statement is quite high; in these cases, the high uncertainty is noted along with the risk statement.

As described in Chapter 2, the Forest and Fish Report has the potential to be developed into a Habitat Conservation Plan that could be in place for up to 50 years. Consequently, the effects analysis in the EIS generally considers "long-term" to mean approximately a 50-year period, but in some circumstances could be a longer time period. Given the definition of "long-term," a "short-term" period is considered approximately 10 years.

Figure 3.1-1. Generalized Relationships among Management Activities and Environmental Components of the Aquatic Ecosystem
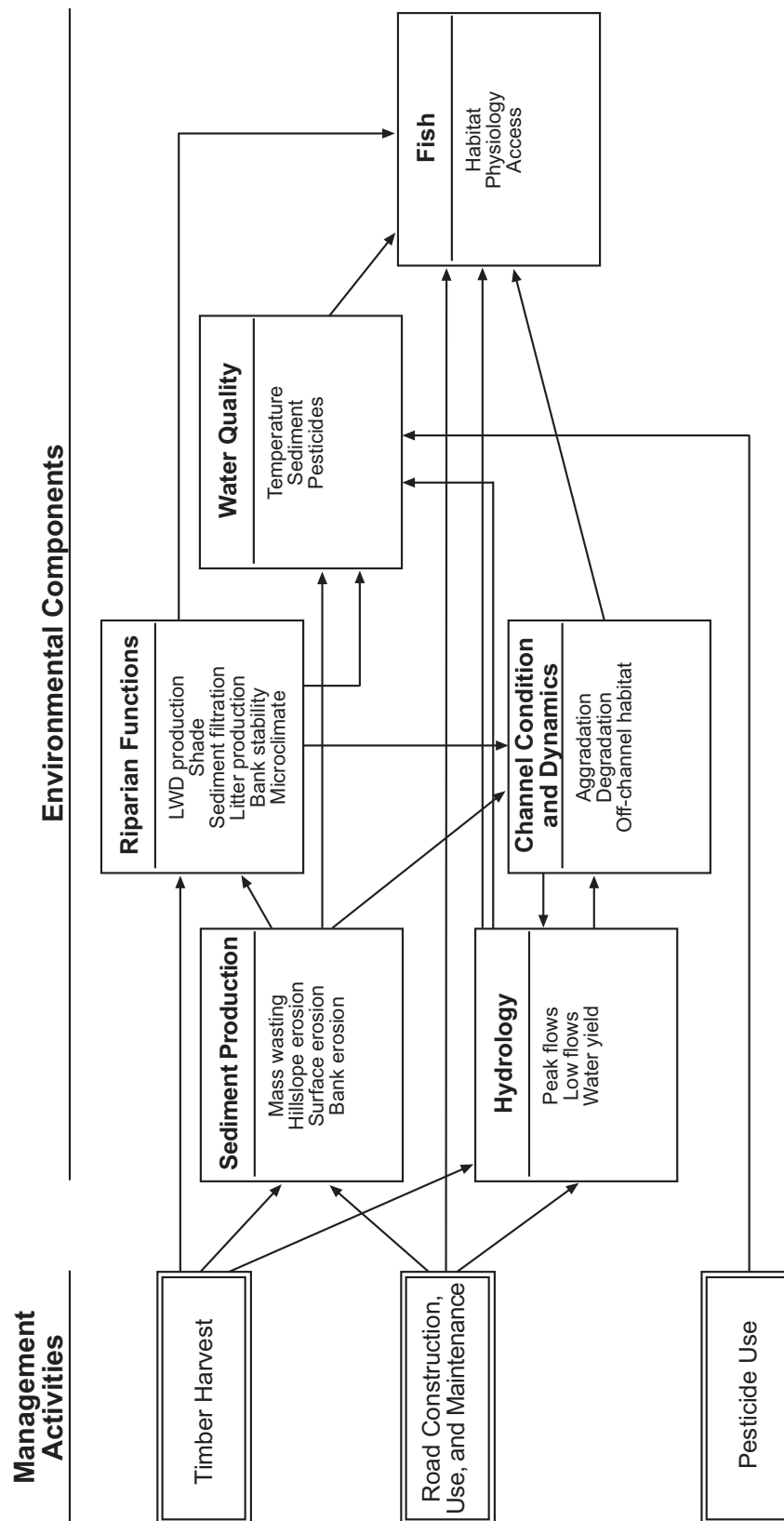
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